

MMS Signaling Examples

Getting closer to how the MMS service works

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1. Introduction

MMS service is considered to be the successor of SMS. Even though in some years that MMS service has been launched in the market by all mobile operators, it is still not clear if MMS will have the same success of SMS. Today most operators are still facing practical issues with this type of service and often this is related to incompatibilities between handsets and service centres. This document provides a short introduction to the typical MMS signalling scenarios. Basic knowledge of MMS signalling is the starting point for users to track and spot service malfunctions.

2. Sending an MMS

In multimedia messaging service the WAP WSP/HTTP is used to transfer multimedia messages between the terminal (MS) and the MMS Proxy-Relay. When looking at the multimedia messages the following message types are used to send an MMS:

- M-Send.req
- M-Send.conf

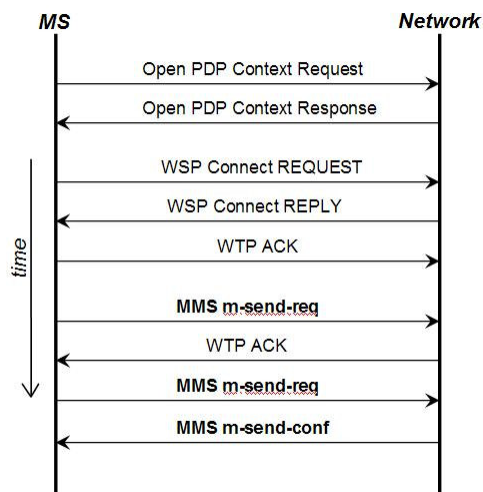


Figure 1: Mobile Originating scenario example. This sequence diagram refers to MMS over WSP

Figure 1 shows how these two messages are used in the MO, Mobile Originating, scenario.

The **M-Send.req** message is used to send the MMS from the mobile. The fields in the **M-Send.req** message are outlined in the table below.

Field	Description
<i>X-Mms-Message-Type (=m-send-req)</i>	To identify the type of message
<i>Transaction-id</i>	That is a unique identifier for the message. It identifies the M-Send.req and the corresponding reply.
<i>X-Mms-MMS-Version</i>	Extremely useful to find compatibility issues.
<i>Date</i>	Optional.
<i>From field</i>	Containing the address of the message sender. This field MUST be present in a message delivered to a recipient.
<i>To, Cc and Bcc fields,</i>	Containing the address(es) of the recipient. At least one of these address fields (To, Cc or Bcc) MUST be present.
<i>Subject</i>	Optional field containing the subject of the message.
<i>X-Mms-Message-Class</i>	Optional field containing the class of the message. The value Auto indicates a message that is automatically generated by the client. If field is not present, the receiver interprets the message as personal.
<i>X-Mms-Expiry</i>	Being the maximum length of time the message will be stored in the MMS Proxy-Relay or time to delete the message.
<i>X-Mms-Delivery-Time</i>	Time of desired delivery.
<i>X-Mms-Priority</i>	Priority of the message for the recipient.
<i>X-Mms-Sender-Visibility</i>	Allowing the MS to specify if hiding or showing the sender address to the receiver.
<i>X-Mms-Delivery-Report</i>	Specifies whether the user wants a delivery report from each recipient.
<i>X-Mms-Read-Reply</i>	Specifies whether the user wants a read report from each recipient as a new message.
<i>Content-Type</i>	The content type of the message.

Table 1: Message fields in the **M-Send.req** message

An example of **M-send.req** message is provided below (Figure 2). MasterClaw can store, decode and correlate MMS signalling over *Gi* interface.



```

09:14:04.925 MMS1-GGSN1 fwd
  IP
    TCP
      HTTP
        -- START LINE --
        REQ_METH : POST
        -- HEADER --
        HOST      : Host: mms
        CON_TYPE  : Content-Type: application/vnd.wap.mms-message
      MMS
        -- Send-Req --
        -- MessageType Information --
        ShortInt  : 1.....
        Header    : 0Ch = X-Mms-Message-Type
        MTypeVal  : 80h = m-send.req
        -- TransID Information --
        ShortInt  : 1.....
        Header    : 18h = X-Mms-Transaction-ID
        -- Version Information --
        ShortInt  : 1.....
        Header    : 0Dh = X-Mms-MMS-Version
        VerMajor  : 1
        VerMinor  : 0
        -- From Information --
        ShortInt  : 1.....
        Header    : 09h = From
        ShortLen  : 1
        AddToken  : 81h = Insert-address-token
        -- DeliverRpt Information --
        ShortInt  : 1.....
        Header    : 06h = X-Mms-Delivery-Report
        DRptVal  : 81h = No
        -- To Information --
        ShortInt  : 1.....
        Header    : 17h = To
        ToVal    : '89099612688/TYPE=PLMN'
        -- ContentType Information --
        ShortInt  : 1.....
        Header    : 04h = Content-Type
        -- CntntTyp --
        ShortLen  : 28
        -- Param --
        -- Multipart Data --
        -- MprtEntry --
        -- CntntTyp --
        LenQuote : 1Fh
  
```

Figure 2: m-send.req example. The MMS-Version field can be used to check version used in by the mobiles.

When the MMS Proxy-Relay has received the Send request, it sends a response message back to the MS indicating the status of the operation. The response message is referred as **M-send.conf** and contains mms-headers only. In this message the *X-Mms-Response-Status* field can be used to determine the success/usuccess of the operation.



```

09:14:11.853 MMS1-GGSN1 fwd
  IP
    TCP
      HTTP
        -- START LINE --
        STAT_CODE : 200
        RES_PHR   : OK
        -- HEADER --
        CON_TYPE  : Content-Type: application/vnd.wap.mms-message
        DATE      : Date: Wed, 14 Jun 2006 07:11:06 GMT
      MMS
        -- Send-Conf --
        -- MessageType Information --
        ShortInt  : 1.....
        Header    : 0Ch = X-Mms-Message-Type
        MTypeVal  : 81h = m-send.conf
        -- TransID Information --
        ShortInt  : 1.....
        Header    : 18h = X-Mms-Transaction-ID
        -- Version Information --
        ShortInt  : 1.....
        Header    : 0Dh = X-Mms-MMS-Version
        VerMajor  : 1
        VerMinor  : 0
        -- RespStat Information --
        ShortInt  : 1.....
        Header    : 12h = X-Mms-Response-Status
        RStatVal  : 80h = OK
        -- RespTxt Information --
        ShortInt  : 1.....
        Header    : 13h = X-Mms-Response-Text
        ShortLen  : 27
        ShortInt  : 1.....
        CharSet   : 4 = iso-8859-1
        RTextVal  : 'Msg received successfully'
        -- MessID Information --
        ShortInt  : 1.....
        Header    : 0Bh = Message-ID
  
```

Figure 3: m-send.conf example. The Status field can be used to check if the operation was completed successfully

Figure 3 shows the decoded version of an **M-send.conf**. The status code confirms that the MMS has been sent successfully.

2.1. Mobile Originating Key Performance Indicators

MasterClaw IP Service KPI provides statistical KPIs (Key Performance Indicators) that can be used to analyze the overall network performances for MO MMS:

- Number of Mobile Originating MMS
- Average MMS PDP Activation Duration Sender (ms)
- Average Mobile Originating GW Access Time (ms): WSP connect delay
- Total MMS send Delay (ms)
- MMS Send Failure ratio

MasterClaw evaluates several counters for each session, and then combines these to get the relevant KPIs. The most interesting are the number of **MMS m-send-req** PDUs, the number of **MMS m-send-conf** PDUs, and the average time in milliseconds between the M-Send-req sent for the first data packet and the M-Send-Conf. The last indicator provides the time taken to upload the MMS from the mobile phone to the network (**MMS upload time**).

A failure in the MO MMS scenario is then detected when the **MMS-send-conf** is missing or, in the MMS over HTTP case, the status response is not 200 OK. The **failure ratio** is then calculated as the ratio between the number of failures and the total number of MO MMSs.

3. Receiving an MMS

Receiving an MMS is a little more complicated as it may take place using different protocols. The typical mobile terminating MMS is usually described by sequence diagrams like the one in Figure 4.

Any Mobile Terminating MMS is triggered by a Multimedia Message Notification, **m-notification.ind**. The MMS notification is used to inform the end user mobile that an MMS is waiting to be fetched. It consists of one MMS header and the contained information is needed to allow the client fetching automatically the MM from the specified location. A transaction identifier is also created by the MMS Proxy-Relay and included in the message. This id is unique up to the following **m-notifyresp.ind**. If the mobile station requests a *deferred* delivery, then the MMS Proxy-Relay may create a new transaction identifier. The request of a deferred delivery is indicated by the mobile by means of an **m-notify.resp**.

Usually the **m-notification.ind** is sent to the mobile phone by means of an SMS. It is common that the end user does not realize that an **m-notification.ind** has been received and that the mobile phone fetches the MMS automatically.

Usually the mobile has to fetch the MM by pointing at a URL which is defined according to RFC 2396, for example *http://mmsc/<message-id>*.

As stated before the **m-notification.ind** triggers always an **m-notifyresp.ind** that is used to confirm that the MM has been received successfully or to postpone the activity.

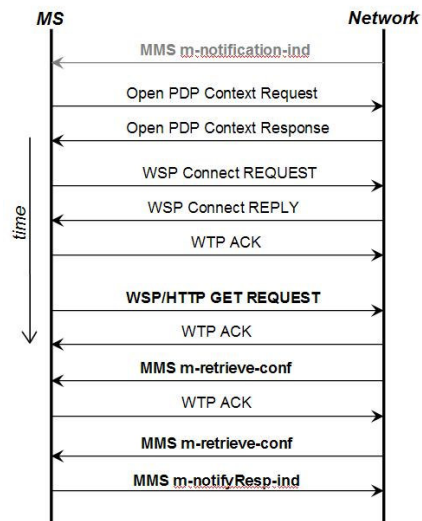


Figure 4: Mobile Terminating MMS scenario, the typical sequence diagram for MMS over WSP

The mobile phone retrieves the message by means of a WSP or HTTP **GET** request to the MMS Proxy-Relay. The request contains the URI to the received message that is provided by the m-notification.ind. An example is provided in Figure 5.

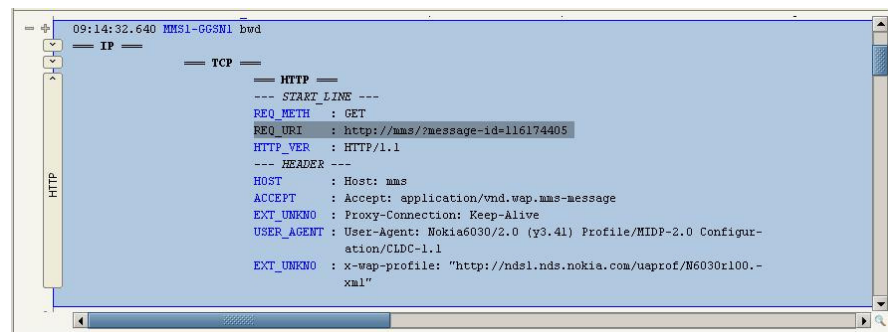


Figure 5: HTTP GET example, the URI contains the message id

When successful, the response to the retrieve request, sent via an **m-retrieve.conf**, will contain the headers and the body/content of the message. This message is used to transfer the MM to the mobile phone. Part of an m-retrieve.conf message is shown in Figure 6.

A MMS Acknowledge message, **m-acknowledge.ind**, confirms the delivery of the message from the receiving terminal to the MMS Proxy-Relay.

In many cases the MS does not respond with an m-acknowledge.ind but rather with an **m-notifyresp.ind**. In these cases the status value is always equal to *retrieved*. An example of this message is provided in Figure 7.

```

== HTTP ==
--- START LINE ---
STAT_CODE : 200
RES_PHR   : OK
--- HEADER ---
CON_TYPE  : Content-Type: application/vnd.wap.mms-message
DATE      : Date: Wed, 14 Jun 2006 07:11:26 GMT
--- MMS ---
--- Retrieve ---
--- MessageType Information ---
ShortInt  : 1.....
Header    : 0Ch = X-Mms-Message-Type
MTypeVal  : 84h = m-retrieve.conf
--- TransID Information ---
ShortInt  : 1.....
Header    : 18h = X-Mms-Transaction-ID
--- Version Information ---
ShortInt  : 1.....
Header    : 0Dh = X-Mms-MMS-Version
VerMajor  : 1
VerMinor  : 0
--- MessID Information ---
ShortInt  : 1.....
Header    : 0Bh = Message-ID
--- Date Information ---
ShortInt  : 1.....
Header    : 05h = Date
--- From Information ---
ShortInt  : 1.....
Header    : 09h = From
ShortLen  : 24
AddToken  : 80h = Address-present-token
FromVal   : '+79099612687/TYPE=PLMN'
--- To Information ---
ShortInt  : 1.....
Header    : 17h = To
ToVal     : '89099612688/TYPE=PLMN'
--- MessClass Information ---
ShortInt  : 1.....
Header    : 0Ah = X-Mms-Message-Class
MClassVal : 80h = Personal
--- Priority Information ---
ShortInt  : 1.....
Header    : 0Fh = X-Mms-Priority
PriorVal  : 81h = Normal
--- Deliverpt Information ---

```

Figure 6: m-retrieve.conf example, the message ID will be the same carried by the m-notification.ind that triggered the action if the transaction has not been deferred. Otherwise it will be just a new number.

```

== IP ==
--- UDP ---
--- MTP ---
--- WSP ---
PduType   : 60h = POST PDU
--- PostEDU ---
URI       : 'http://mms/'
--- Content ---
ShortInt  : 1.....
KnownFldn : 0Dh = Content-Length
ShortInt  : 1.....
ContentLen : 30
--- MMS ---
--- Notifyresp ---
--- MessageType ---
ShortInt  : 1.....
Header    : 0Ch = X-Mms-Message-Type
MTypeVal  : 83h = m-notifyresp.ind
--- TransID ---
ShortInt  : 1.....
TransID    : 18h = X-Mms-Transaction-ID
TIDVal     : '12526872@mms.beeline.ru'
--- Version ---
ShortInt  : 1.....
Version    : 0Dh = X-Mms-MMS-Version
MajorVal   : 1
MinorVal   : 0
--- Status ---
ShortInt  : 1.....
Status    : 13h = X-Mms-Status
StatusVal  : 81h = Retrieved

```

Figure 7: m-notifyresp.ind example. Very often this message is used to confirm that the message has been retrieved, instead of the m-acknowledge.ind.

3.1. Mobile Terminating Key Performance Indicators

MasterClaw IP Service KPI provides statistical KPIs that can be used to analyze the overall network performances for MT MMS:

- Number of Mobile Terminating MMS

- AVG Mobile Terminating GW Access Time (ms)
- AVG MMS PDP Activation Duration Receiver (ms)
- Total MMS Receive Delay (ms)
- MMS Receive Failure ratio
- Failure delivery ratio

MasterClaw evaluates several counters for each session and then combines these to get the relevant KPIs. The most interesting are the number of MMS **m-notify-resp-ind**, the number of **m-retrieve-conf**, the **MMS download time** that is defined as the average time in ms between the WSP/HTTP **GET REQUEST** and the **M-NotifyResp-ind**. It provides the time taken to download the MMS to the mobile phone from the network. Also the **MMS delivery time** is provided and it is defined as the average time in milliseconds between the WSP-Connect-Request and M-Notify-Resp-ind. This indicator takes into account also of the initial WSP setup and therefore is always greater than the MMS download time. It provides the time taken by the network to delivery the MMS to the end user.

A Failure in the MT MMS scenario is detected when the MMS-notify-response-indication and the MMS m-retrieve-conf are missing or the status is not 200 OK for the MMS over HTTP cases. The **failure ratio** is then calculated as the ratio between the number of failures and the total number of MT MMSs.

4. Other Scenarios

When the sender requests a delivery report then an **m-delivery.ind** is sent from the MMS Proxy-Relay to the originating mobile phone. This message is not sent if the sender has not asked for a delivery report or if the receiver has explicitly requested for denial of the report. For example, the receiver can deny the delivery report by using the **X-Mms-Report-Allowed** field of the m-acknowledge.ind or m-notifyresp.ind messages.

There is no response message to the delivery report.

5. Interoperability between different MMS versions

When the proxy-relay server receives any PDU having a major version number which is not supported then it replies with an **m-send.conf** containing status value **error-unsupported-message**.

When a mobile terminal receives any PDU having a major version number which is not supported, then it replies with an **m-notifyresp.ind** containing status value **unrecognized**. After this cases the proxy-rely server or the terminal try to adapt to a common protocol version if supported. The new attempts are based on the major version contained in the error response.

Statistics and analysis on the m-send.conf and m-notifyresp.ins status codes can provide useful information on MMS interoperability issues.